

**UNITED STATES PATENT APPLICATION**

of

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for

**PAUSING TELEVISION PROGRAMMING IN  
RESPONSE TO SELECTION OF HYPERTEXT LINK**

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**PAUSING TELEVISION PROGRAMMING IN  
RESPONSE TO SELECTION OF HYPERTEXT LINK**

**CROSS-REFERENCE TO RELATED APPLICATIONS**

[001] This application is a continuation of U.S. Patent Application Serial No. 08/900,417, filed July 25, 1997, which is a continuation-in-part of U.S. Patent Application Serial No. 08/641,517, filed May 1, 1996, which is a continuation-in-part of U.S. Patent Application Serial No. 08/306,642, filed September 15, 1994 which is a continuation-in-part of U.S. Patent Application Serial No. 08/038,240, filed March 29, 1993. The foregoing patent applications are incorporated herein by reference.

**BACKGROUND OF THE INVENTION**

[002] Ever since events have been transmitted to and received by devices, such as radios and televisions, people have desired to be able to pause the display of a continuous event at selectable periods. Consider the example of a program being watched on a television and a viewer leaves the room to attend to a phone call. In this case, the display of the program would preferably be interrupted so that the viewer does not miss any of it. Upon returning, it is desirable to be able to resume viewing or listening to the transmitted event from the point at which the viewer left the room.

[003] Also, when watching television, very often the viewer would like to return to a previous period in the continuously transmitted event to review that interval again. This is conventionally possible using a recording, such as a video tape of the event. In this case, the user is able to pause the video tape at any desired time. Then, at any future time the viewer can begin playing the tape again and watch the recorded event starting from the point of time on the



not when to watch it. Each television program is broadcasted from a television station, beamed from a satellite or carried over a cable, to each television set in a synchronous manner. Stated otherwise, each television set that is tuned to a particular channel receives the same television program starting and ending at the same times. Those who wish to view a program must synchronize their schedules with the time of the program broadcast. Video tape recorders have become very popular devices because they let a viewer watch a program asynchronously, but only after the program has been aired. That is, a viewer can watch the recorded program at any time he or she desires. A VCR can be programmed to record a certain show on a certain channel at a certain time. A viewer can then view the show at a later time by playing the recorded VCR tape. However, a viewer still must wait until the entire program has been received and recorded before viewing the play back from the VCR tape.

[007] A VCR tape records a video signal in a linear sequential manner that is not randomly addressable. If the portion of the recorded program that is to be replayed is at the end of the tape, the tape must be "fast forwarded" all the way through until the beginning of the desired portion is reached. To play back a particular portion of a recorded program, the VCR tape must be either rewound or fast forwarded to the segment of tape that contains the recorded portion. However, recently recording/play back devices and disk recording media have been developed that allow a video signal to be recorded and played back in a random access manner. To replay a particular portion of a recorded event, the play back head of the recording device can quickly access the location of the disk that contains the information. Thus searching for and retrieving of a particular recorded portion can be much quicker from a disk recording medium as opposed to a tape recording medium. Further, typically the information recorded on a disk is indexed by storing distinguishing information in a file allocation table located on the disk. When a

particular set of information is to be retrieved, its location on the disk is found by referencing the file allocation table.

[008] A video signal contains a large amount of information, and thus requires a recording scheme with a large storage capacity to record, for example, a television program in its entirety (as can be done using a conventional VCR). Recently developed video compression technology and recording media now enable a useful amount of video information to be recorded in a random access manner. This recent technology includes MPEG compression, recordable compact disks, magneto-optical disks, phase change optical disks, and the like. Companies such as Sony, Hitachi and 3M are increasing the storage capacity of magneto-optical disks, and Matsushita is making advances in phase change storage technology.

[009] The accepted wisdom in the art is that a video cassette recorder can be used to make a recording of a television show so that the show can be later watched by a viewer in an asynchronous manner, that is, with pauses and replays determined according to the desires of the viewer.

[010] In accordance with the teachings of the prior art, a dual deck recorder can be used to make copies of prerecorded tapes, or possibly record two different shows at once (if two channels can be tuned in), or possibly watch one prerecorded show while taping another.

[011] There is no prior reference that enables a television program to be viewed at a pace dictated by the viewer, even through the television program continues to be aired. No prior device allows a viewer to watch a broadcast television program during the broadcast as if it were a prerecorded tape (with the one exception of fast forwarding through portions of the program that have not yet been received).

[012] The Internet has recently exploded in popularity. Computer users are getting on-line to search for and download their choice of information from the large amount of information

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[015] On yet another front, it has become cliché that most VCR users have much difficulty in programming their VCRs to record television programs. Even with on-screen programming, and other attempts to demystify the process, most people simply cannot program their VCRs.

[016] On yet another front, there is a need for a device that enables users to enjoy the benefits of the on-line experience via their television. Products are being made available that enable a user to connect with the Internet through a cable or telephone modem and display, for example, world wide web pages on their television. However, these products, such as WebTV from Philips Magnavox and Sony, merely allow the user access to the Internet. They provide no means for pausing the display of a television program according to the user's desires. They also fail to offer the advantages of any of the inventions as will be discussed below.

## **BRIEF SUMMARY OF THE INVENTION**

[017] The invention described herein is intended to overcome the drawbacks of the conventional art. In accordance with the present invention(s) a time shifting event recorder is provided capable of recording portions of a time sequential signal representing an event so that a representation of the event can be produced in a time shifted manner.

[018] The present invention(s) described herein enables a viewer to arbitrarily pause a television program, access a computer network such as Internet, explore the content available at the viewer's leisure and then resume viewing the program at any time without missing any of it.

[019] In accordance with the present invention(s), the viewer has control over how a movie or television show is viewed in a manner that is not conventionally possible. If a particularly interesting or complex scene occurs, the viewer can replay it, and then return to the movie without missing any of it. If the phone rings, the viewer can pause the display of the television show, and then return to uninterrupted viewing of it at any future time, even while the rest of the show is being received, and not miss anything.

[020] Further, the present invention(s) utilizes the vertical blanking interval (VBI) of a television program to carry Internet sites, Internet addresses or other related information that is relevant to the television program (or television commercial). The VBI is a portion of the television signal that does not contain program information, it is typically used for services such as closed-captioning. As described in detail herein, all or a portion of the related VBI-embedded information may also be "front loaded" and placed at the beginning of the time sequential signal. Once received, this information can be stored on a conventional data storage device, such as a hard drive, RAM, or the like, so that it is retrievable by a viewer at any time.



Since individuals will be receiving a bulk of the relevant data en masse, widespread use of the inventions may reduce the demand on the Internet for modem connection bandwidth.

[021] An example use of the present invention(s) would allow an advertiser to include a pathway to its information pages contained in the VBI information, world wide web page or Internet Site along with a television commercial. A viewer that wishes to learn more about an advertised product, such as an automobile, merely has to click his remote control to get the advertiser's information pages displayed. The instant the information page is available for viewing, the display of the program is paused, and time shifting recording of the program begins. This use could open the door to more targeted marketing opportunities for advertisers who today use the television to appeal to a mass audience. The invention(s) described herein can be utilized to allow such television advertisers to appeal to a more target market.

[022] After perusing the advertiser's Internet site or information pages, the viewer can return to the television program and it is automatically replayed from the point of departure. The unique recording capabilities enabled by the inventions ensures that the viewer does not miss any of the program, no matter when or how long the Internet session takes. In accordance with the use of the present invention(s), the information available about a product does not end with the commercial. Rather, a television commercial can be linked to content where much more information can be found by a consumer with interest in the product.

[023] The inventions described herein allows Internet network content to mix with the cable or broadcast TV medias. The inventions described herein can be used to provide viewers of a television program a pathway to a related Internet site, and a pathway from the Internet site to other television programs. For example, a viewer who enjoys a particular movie can access an Internet site that provides a hyper-link to other sites, web pages, newsgroups, or FTP addresses about other movies or programs available in the same genre.

[024] Also, the Internet site can be used to locate future programs that the viewer wishes to watch. In this case, an Internet site can be set up that includes the programming information for each cable or satellite television system. The choice of the correct programming information is made available to each Internet subscriber by determining the locality of the user's modem connection (based on, for example, caller ID, area code and/or phone number). The Internet subscriber can also manually choose which cable or satellite system programming schedule to view. The inventions described herein can be incorporated into a cable television set top box that is programmable, via a download of information included in the television signal, the Internet, intercast or intranet site, to remind the viewer just before a selected program airs. The inventions described herein can be incorporated in a set top box capable of controlling an existing VCR to record the programs selected from a programming grid shown at, for example, an Internet web site or delivered to the user via the television signal. This feature is very exciting because it will allow VCR owners to finally easily program their VCRs to tape selected shows simply using a point and a click.

[025] In accordance with the present inventions, the selected recording of television programs is made simple. A television program schedule is received by the user, either via a network connection or through the television signal. The user can search for and select programs that are to be recorded from an on-screen programming grid (or other information display format). Upon selecting the programs to record, control signals are downloaded to the user's apparatus (computer, digital television, Internet appliance, etc.). The control signals are used to generate remote control signals or directly control VCR or other video recording so that program recording occurs as desired.

[026] As another example use of the present invention(s) set top box, a sporting event can be viewed with instant-replays that are controlled by the viewer and additional information

embedded in the VBI, such as the scores of other games or player stats, accessed at any time. Hyper-links to Internet sport pages or chat rooms can be included and the information displayed in a split screen along with the game, or the viewing of the game can be paused at the viewer's discretion for any length of time. Even with these arbitrary pauses the present invention(s) permits the viewer to watch the entire game, no matter when and how many viewing pauses are taken.

[027] The present inventions described herein can be provided in desktop computers used by schools to provide inexpensive individualized computer-aided instruction. Each student can pause the display of a multicasted videotaped lesson at any time, and access additional related information available from the computer memory, Internet, intercast or intranet to enable self-paced learning.

[028] This method can also be used for "in-home" learning, to allow children, as well as adults, to continue their education in a self-paced manner. A piano lesson, for example, can incorporate a video included in a television broadcast; web-like pages embedded in the VBI; and an Internet site accessible by hyper-links that are also embedded in VBI. The video shows a piano instructor, the web-like pages include text and sheet music specific to the piano lesson, and the Internet site contains more text, video clips and sheet music, as well as links to related Internet sites

[029] With the present inventions and an Internet connection, the home-student can sit at the piano, view the video-taped instructor, and control the pace of this learning session with a remote controller. The display of the video can be paused, the web-like pages embedded in the VBI can be displayed, text read, and sheet music printed at any time appropriate for that particular student. If more information is needed, a hyper-link embedded in the VBI can be clicked to bring up a related Internet site. Once on Internet, the student will be free to search

for and retrieve content related to piano lessons; piano construction; local piano classes; flute classes; and, if the student's interest should wander, fly-fishing or basket weaving. The student can later return to earlier Internet pages or the stored web-like pages, select from another stored hyper-link, or return to viewing the video at any time, including while the video is still being aired or a week thereafter. This power-learning scheme is only made possible using the present invention(s).

[030] In accordance with the present invention(s), a viewer can suspend at will the viewing of a broadcast television program. The program is time shifted depending on the user's preferences paving the way, for example, for television/Internet options not obtainable from currently available technology.

[031] In accordance with the present inventions, a time shifting event recorder is provided including receiving means for receiving a time sequential signal representing an event. Recording means records in a first recording medium at least one selected portion of the time sequential signal and recording means records in a second recording medium at least one other selected portion of the time sequential signal different from the at least one selected portion first recorded by the recording means. Playing-back means retrieves at selectable intervals the respective selected portions of the time sequential signal recorded in the first and second recording media and generates a play back signal dependent thereon. Controlling means controls the first and the second recording means to record the respective selected portions of the time sequential signal. The controlling means also controls the playing-back means to retrieve at the selectable intervals the respective selected portions of the time sequential signal and generate the play back signal, so that a representation of the event can be produced in a time shifted manner.

[032] The time sequential signal can either be a video, audio, or other information carrying signal. The recording media can be a magnetic tape, a magnetic disk, an electronic memory circuit, an optically recordable disk, or any other suitable recording medium. In accordance with one embodiment of the present invention(s), each recording medium is part of a same recording medium, such as a same recordable disk. Remote control inputting means may be provided for inputting user selectable control signals to the control ling means so as to control the production of the representation of the event in a user definable time shifted manner. The time sequential signal can be stored as digital data, analog data, and the like.

[033] In accordance with another embodiment of the present invention(s), the recording means is provided for recording in a third recording medium gap portions of the time sequential signal different from the portions recorded by the first and second recording media. The gap portions are recorded or played backed at times when either of the first or the second recording means is not able to record and/or playback the time sequential signal (such as during a rewind or play back period). The playing-back means is capable of retrieving at a gap interval each gap portion of the time sequential signal recorded in the third recording medium. The controlling means controls the recording means to record each gap portion of the time sequential signal. The controlling means also controls the playing-back means to generate the play back signal so that a representation of the event can be produced in a time shifted manner, without a break caused by a time when either of the first or the second recording means is not able to record the time sequential signal.

[034] In accordance with still another embodiment of the present invention(s), one of the recording means consists of an already existing recording apparatus such as a VCR. In this embodiment, the controlling means is adapted to control both a recording means and the recording apparatus so that a representation of the event can be produced in a time shifted

manner. The controlling means may control the recording apparatus (VCR) via remote control signals by accessing the VCR's remote control capabilities.

[035] In yet another embodiment of the present invention(s), supplying means is provided for supplying a play back signal of a previously recorded portion of the time sequential signal and a current portion of the time sequential signal to a display device simultaneously so that a time shifted representation of the event can be displayed simultaneously with a current representation of the event on the display device. In this embodiment, the viewer is thus able to return to a portion of the event being viewed and watch that portion again while simultaneously viewing the event in real time, providing user-determined instant replays of previously displayed portions of the television program. In fact, the present inventions can be configured so that the viewer may view other portions of the event, recorded on the second, third, etc. recording media, simultaneously with the portion recorded on the first recording medium and/or the current reproduction of the event.

[036] The inventive apparatus can be used for displaying a received television program while simultaneously displaying a time shifted (paused) program in a picture-in-a-picture window. In accordance with this aspect of the invention, a cable television set top box incorporates the inventive recording apparatus. A time sequential signal (cable television signal) is received via a cable television line. The cable television line carries a number of different channels, each channel carrying a different program. Usually, a viewer selects which channel is tuned into using a remote control. In accordance with the present invention(s), the viewer can pause the display of a first program, and switch to another channel to view a different program. The paused program is recorded in the manner described herein so that the viewer can resume viewing the program at any time, without missing any of it. Further, a modification of the recording scheme discussed above can be utilized to enable simultaneous pausing of two or

more programs or switching between two or more programs without missing any portion of either. For example, a viewer can start watching a program 1, and then decide to start watching a program 2. When program 1 is paused, the recording means begins recording a first recorded portion 1 of program 1. While the first recording portion 1 is being recorded, the viewer changes the television channel to start watching program 2. The viewer may then decide to watch program 1 again and so the first recorded portion 1 is played back. At the same time that the first recorded portion 1 is being played back, a second recorded portion 1 of program 1 is recorded and a first recorded portion 2 is recorded by the recording means (on different recording media, or on a same recording media as described above). The recording and playback of the two programs continues on in the manner illustrated herein to enable the viewer to watch both programs at his or her leisure. If the viewer switches to a third program or takes a break, then both programs can be simultaneously tuned in and recorded on respective recording mediums.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

[037] Figure 1 is a block diagram showing an embodiment of the time shifting event recorder in accordance with the present invention(s);

[038] Figure 2 is a block diagram showing in more detail an embodiment of the time shifting event recorder in accordance with the present invention(s);

[039] Figure 3 is a block diagram showing another embodiment of the inventive time shifting event recorder;

[040] Figure 4 is a block diagram showing another embodiment of the inventive time shifting event recorder;

[041] Figure 5 is a block diagram of another embodiment of the inventive time shifting event recorder;

[042] Figure 6 is a flow chart illustrating the steps of the inventive method of pausing the display of a time sequential signal, and the steps of the operation of the inventive apparatus for the pausing the display of a time sequential signal;

[043] Figure 7 illustrates the inventive apparatus in use displaying a received television program while simultaneously displaying a time shifted program in a picture-in-a-picture window;

[044] Figure 8 illustrates the inventive apparatus in use displaying a received television commercial having a linked Internet address;

[045] Figure 9 illustrates the information that might be displayed when a user activates the hyperlink or hypertext message included along with a television commercial;

[046] Figure 10 illustrates the information that might be displayed when the user activates one of the hyperlinks included with an interval page;



- [047] Figure 11 illustrates the information that might be displayed with the user activates one of the Internet hyperlinks included with an interval page;
- [048] Figure 12 illustrates another Web page in accordance with the on-line television program selection and recording aspects of the present invention(s);
- [049] Figure 13 illustrates another Web page in accordance with the on-line television program selection and recording aspects of the present invention(s), and shows the user of a flat screen display remote input device;
- [050] Figure 14 shows a display of preview information of television programs in accordance with the present invention(s);
- [051] Figure 15 shows a television display during a time shifting operation;
- [052] Figure 16 shows an on-line browser displayed during the pause in the television viewing;
- [053] Figure 17 shows a television commercial displayed along with a television program;
- [054] Figure 18 illustrates the display toggled between a preview screen and a viewed television program;
- [055] Figure 19 illustrates a television commercial displayed with a hyper-link to related content;
- [056] Figure 20 is a block diagram illustrating the components of a television system enabled with the inventive technology;
- [057] Figure 21 is a block diagram illustrating the components of another television system enabled with the inventive technology;
- [058] Figure 22 shows a screen displaying television program scheduling information delivered via a television signal;

[059] Figure 23 shows a screen displaying television program scheduling information delivered via a television signal;

[060] Figure 24 shows a configuration of a remote control input device that can be used in accordance with the present invention(s);

[061] Figure 25 shows another configuration of a track pad remote control input device that can be used in accordance with the present invention(s);

[062] Figure 26 shows another configuration of a track ball remote control input device that can be used in accordance with the present invention(s); and

[063] Figure 27 shows another configuration of a wireless keyboard input device that can be used in accordance with the present invention(s).

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[064] For purposes of promoting an understanding of the principles of the invention, reference will now be made to the embodiments illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, there being contemplated such alterations and modifications of the illustrated device, and such further applications of the principles of the invention as disclosed herein, as would normally occur to one skilled in the art to which the invention pertains.

[065] In accordance with the present invention(s), a viewer can pause the display of, for example a television program, at any time and for any length of time (limited by the recording capacity of the recording media). The pause can take place while the program is being aired, and the viewer can return to viewing the program from the point where the pause began, even while the program continues to be received. During the pause the viewer may replay a previously recorded portion of the program, fast forward through a recorded portion, simply take a break from viewing and/or switch to another channel. Also, the present invention(s) allows a viewer to pause the display of a program and switch to another media system, such as an Internet connection. The viewer can access information from the Internet computer network while pausing the display of a television program.

[066] As an example of this application for the present invention(s), the time sequential signal that carries a television program usually includes commercial messages. The commercial message may include information regarding an advertiser's world wide web site, or other computer network address. The address may be included as information contained in the video vertical blanking interval (a portion of the video signal that is received during a time when the video display scanning returns to the top of the screen). This address information can be

accessed so that a viewer can access the advertisers computer network location for more information on a particular product that is described in the commercial message. The viewing of the program can be time shifted while the viewer accesses the advertiser's computer network site. Once the viewer has reviewed the computer network site, he can return to the television program without missing any of it.

[067] Referring to Figure 1, an embodiment of the inventive time shifting event recorder will be described. Receiving means 12 receives a time sequential signal representing an event. The time sequential signal may be, for example, a program broadcast via radio and microwaves for display on, for example, a television or a radio. The time sequential signal may also be transmitted through a transmission medium other than the air, such as a coaxial cable or fiber optics used by the cable television industry. Conventionally, this time sequential signal is converted into visual video signals and/or audible audio signals so that a continuous representation of the event can be viewed and/or listened to by an observer. However, if the observer is distracted from observation of the time sequential representation of the event, there is no conventional way to time shift the observable representation of the event, other than by the conventional method of recording the entire rest of the time sequential signal, waiting until the event (such as a television program) is over, and then rewinding and replaying the recorded time sequential signal.

[068] To overcome this drawback, in accordance with the present invention(s), a first recording means 14 records in a first recording medium 16 at least one selected portion of the time sequential signal. In other words, if the viewer of a television program were to leave the room, the first recording means 14 is activated to record that selected portion of the time sequential signal received during the viewer's absence. Upon returning, the viewer activates the playing-back means 18 to retrieve at the selectable interval (the viewer's return), the recorded

selected portion of the time sequential signal recorded in the first recording medium 16 during the viewer's absence. The playing-back means 18 produces a play back signal from this recorded time sequential signal portion so that the viewer can view the television program where he or she left off. While the viewer is viewing the time shifted portion of the television program, a second recording means 20 records in a second recording medium 22 another selected portion of the time sequential signal. In other words, since the television program continues on time sequentially, while the viewer is viewing the first recorded portion recorded in the first recording medium 16 the second recording means 20 continues recording the time sequential signal at the point at which the recording by the first recording means 14 is stopped so that the signal can be played back.

[069] After the time sequential signal recorded by the first recording means 14 has been played back (so that the viewer is able to view that portion of the television program that was aired in his absence), the playing-back means 18 retrieves the portion of the time sequential signal recorded by the second recording means 20 so that it may be played back. Thus, the continuous time sequential signal representing the event (the television program) is time shifted and the viewer views the program continuously upon returning, starting from the point in time at which the viewer first stopped viewing the program. Controlling means 24 controls the first and second recording means 14,20 to record the respective selected portions of the time sequential signal. The controlling means 24 also controls the playing-back means 18 to retrieve at the selectable intervals the respective selected portions of the time sequential signal, so that the play back signal can be generated and a representation of the event can be produced in a time shifted manner. The time sequential signal can be a video signal or an audio signal. The recording media can be a magnetic tape, a magnetic disk, an electronic memory circuit (such as

an EPROM, or other electronic storage device) an optically recordable disk recording medium, or any recording medium now known or later developed.

[070] Figures 1 and 2 show an inventive recording device for pausing the display of a received time sequential signal (TSS) on a displaying device, such as a television, computer monitor, or radio. In accordance with the present invention(s) recording means 14 is provided for recording a first recorded portion of a received time sequential signal. The recording means 14 also records a second recorded portion of the received time sequential signal Input receiving means 32 is provided for inputting a pause display command and a resume display command. The pause display command and the resume display command are instructions received from the viewer (via a remote control, voice activation mechanism, computer keyboard, or mouse, for example) to allow the control of the viewing of, for example, a television program depending on the viewer's preference.

[071] Determining means 23 is provided for determining a beginning of the first recorded portion. The determining means 23 includes a start-recording value setting means 25 for setting a start-recording value. As will be described in more detail below, the start-recording value is utilized for determining where on the recording medium the beginning of a recorded portion of the time sequential signal is physically (or electronically) located. For example, the start-recording value may be a counter value that corresponds to where on a VCR tape or other magnetic recording tape the beginning of a recorded portion of the time sequential signal is located. The counter may be an electronic digital counter that provides a counter value signal which can be stored in a memory device, such as a RAM. Each counter value signal corresponds to a segment of the length of the VCR tape.

[072] The start-recording value may be a tone, such as a tone having a frequency beyond the range of hearing of humans, which may be recorded on the recording medium so that after

recording has taken place the location of the beginning of the recorded portion of the time sequential signal can be found by rewinding the VCR tape, or other recording medium, until the particular recorded tone is found. The tone can be found using a frequency filter that is set to the frequency of the tone signal. Further, different tones can be used to signify different portions of the recorded time sequential signal (and as will be described below, recorded tones can be utilized as a stop-recording value). The filter can be adjustable to enable recognition of each particular frequency.

[073] The determining means 23 further includes start-recording value detecting means 27. The start recording value detecting means 27 detects the start-recording value. For example, if the start-recording value is a tone, the location of the tape where the tone is first recorded can be determined by a frequency filtering mechanism that filters out the tone frequency or that filters out frequencies that are not the tone frequency. Stated otherwise, the beginning of the recorded portion of the time sequential signal is located on the VCR tape at the location of the beginning of the recorded tone. The beginning of the recorded portion is located by locating the beginning of the recorded tone.

[074] Playing-back means 18 is provided for playing back the recorded portions of the time sequential signal (i.e., the first recorded portion and the second recorded portion). Controlling means 24 controls the determining means 23 to determine the beginning of the first recorded portion depending on the pause display command. The controlling means 24 may thus control the start-recording value setting means 25 depending on and in response to the received pause display command. When the pause display command is received, the start-recording value setting means 25 sets the start-recording value so that after the portion of the time sequential signal has been recorded its beginning can be located.

[075] The controlling means 24 also controls the recording means 14 so that the first recorded portion is recorded depending on the pause display command. Once the first recorded portion of the time sequential signal has been recorded and the viewer wishes to begin viewing the program again, the controlling means 24 controls the playing-back means 18 so that the first recorded portion is played back depending on the start-recording value, and depending on and in response to the resume display command. The controlling means 24 also controls the recording means 14 so that the second recorded portion is recorded while the first recorded portion is being played back.

[076] In accordance with the present invention(s), the recording means 14 comprises at least one of a magnetic recording tape, a magnetic recording disk, an optical recording disk, an electronic recording circuit, and a recording medium. The recording medium may be, for example, a magnetic recording medium, an optical recording medium, a holographic recording medium, or an electronic recording medium. In the case of an electronic recording medium, a dynamic random access memory (DRAM) may be used. An example of such a DRAM is to be produced by NEC Corporation of Japan. NEC Corp. has prototyped a DRAM chip that can store more than 4 billion bits of information, enough to hold 47 minutes of full-motion video. Compression techniques, such as MPEG, may be employed to store a greater amount of video on such a chip. In accordance with the present invention(s), a single DRAM may be used as both the first and the second recording mediums 16,22 if it is capable of simultaneously recording and playing back information. Alternatively, two or more DRAMs can be utilized as the respective first, second (and if desired third, and so on) recording mediums. In any event, the operation of the recording and playing back of the received time sequential signal will be controlled as described herein to enable a viewer to arbitrarily pause the display of, for example, a received television program, and then later return to the viewing of the program



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the recorded portions of the tune sequential signal. The type of start-recording value setting means 25 utilized in accordance with the present invention(s) will depend upon the type of recording means 14 utilized. However, it is important to note that in accordance with the present; invention(s) the recording means 14 utilized may be comprised of two or more different types of recording media, such as a VCR tape and an optical disk. The inventive recording device can be utilize in conjunction with a VCR tape recorder or a digital recorder, for example, so that the necessary component parts (recording/play back head, motor 45, circuitry) of the inventive recorder are reduced while still allowing the unique and useful functionality of pausing the display of a time sequential signal on a displaying device 44, such as a television, depending on the viewer's preference. The start-recording value comprises at least one of a tone signal, a counter value, file allocation table address, and a location on a recording medium.

[079] In accordance with the present invention(s), the determining means 23 may include stop-recording value setting means 31 for setting a stop recording value. The stop-recording value indicates where the end of each recorded portion of the time sequential signal is located on the recording medium. For example, another tone (which may be different than the tone of the start-recording value) may be recorded on a recording medium, such as a VCR tape, to signify the end of the recorded portion of the time sequential signal. The tone may be recorded simultaneously with the end, or immediately after the end of the recording of the portion of the time sequential signal. The invention further includes stop-recording value detecting means 29 for detecting the stop-recording value. The stop-recording value setting means 31 may comprise one of a tone signal generator, a counter, a file allocation address generator, and a recording medium location address storing means. The stop-recording value may comprise at

least one of a tone signal, a counter value, a file allocation table address, and a location on a recording medium.

[080] Stated otherwise, the inventive apparatus for pausing the display of a received time sequential signal includes recording means 14 for recording a first recorded portion of a received time sequential signal and for recording a second recorded portion of the received time sequential signal. Input receiving means 32 inputs a pause display command and a resume display command. Determining means 23 determines the beginning of the recorded portion. Playing-back means plays back the first recorded portion and the second recorded portion in a time-shifted manner. In accordance with the present invention(s), controlling means 24 controls the determining means 23 to determine the beginning of each recorded portion depending on the pause display command. When the pause display command is received, the determining means 23 makes an indication of the physical or electronic location of the beginning of the recorded portion. This indication (start-recording value) is used for finding where each recorded portion begins. The physical location of the beginning of each recorded portion may be; for example, a segment of a recording tape, or a sector and/or track of a recording disk, etc. The electronic location may be an address of a memory circuit, etc. The controlling means 24 controls the recording means 14 so that the first recorded portion is recorded depending on the pause display command. When the pause display command is received, the recording means 14 begins recording a recorded portion of the time sequential signal. The controlling means 24 also controls the playing-back means so that the first recorded portion is played back depending on the beginning determined by the determining means 23 and depending on the resume display command. The controlling means 24 also controls the recording means 14 so that the second recorded portion is recorded simultaneously while the first recorded portion is being played back. The recording of the second recorded portion depends on the received resume

display command, since after taking an initial break when the viewer wishes to resume viewing the program, the viewer inputs the resume display command to the controlling means 24 (via remote control, voice activation circuitry, keyboard, mouse, or other input device). The first recorded portion is then played back, while the second recorded portion of the time sequential signal is recorded.

[081] In accordance with the present invention(s), the controlling means 24 includes determining means 23 for determining if the ending of the first recorded portion has been played back. As long as the ending of the first recorded portion has not been played back, then the controlling the playing-back means continually plays back the first recorded portion of the time sequential signal, while simultaneously recording the second recorded portion of time sequential signal. If the ending of the first recorded portion has been played back, the controlling means 24 is effective for controlling the recording means 14 for recording an ending of the second recorded portion of the time sequential signal on the first recording medium 16. Then, the controlling means 24 controls the playing-back means for playing back the second recorded portion of the time sequential signal using the second start-recording value to determine the beginning of the second recorded portion.

[082] In accordance with the inventive apparatus, the start-recording value setting means 25 may also be effective in setting a third start-recording value, a fourth start-recording value and so on, allowing the viewer to take any number of breaks in the viewing of the continuously received time sequential signal by recording third, fourth, etc. recorded portions that are played back in a time shifted manner. In accordance with the present invention(s), time shifting is defines as allowing a viewer to view a conventionally synchronous program in an asynchronous manner.

[083] In the case of a third recorded portion, for example, the recording means 14 records a beginning of a third recorded portion of the time sequential signal on the first recording medium 16. The third recorded portion can be recorded on a third recording means 14, or the first and the third recording means 14 can be one in the same. If the first recorded portion has already been played back, then the third recorded portion can be recorded over it, or at least a portion of the third recorded portion can be recorded on a different location of the recording medium holding the first recorded portion. The controlling means 24 controls the determining means 23 to be effective for determining if the ending of the second recording portion has been played back. If the ending of the second recorded portion has not been played back, then the controlling means 24 controls the playing-back means for continuing playing back the second recorded portion of the time sequential signal, while simultaneously recording the third recorded portion of the time sequential signal. If the ending of the second recorded portion has been played back (i.e., the second stop-recording value is detected) then the controlling means 24 controls the recording means 14 to record an ending of the third recorded portion of the time sequential signal on the first recording medium 16. Then, the controlling means 24 controls the playing-back means to play back the third recorded portion of the time sequential signal using the third start-recording value to determine the beginning of the third recorded portion, and so on, playing back the recorded portions in the order that they were recorded, while allowing the viewer to pause the display, rewind and review, fast forward, etc., making viewing of the program asynchronous and under the complete control of the viewer.

[084] The determining means 23 further includes stop-recording value setting means 31 for setting a first stop-recording value for determining the ending of the first recorded portion. In this case, the determining means 23 includes means for determining if the ending of the first recorded portion has been played back by detecting the first stop-recording value.

[085] In accordance with the inventive apparatus, the determining means 23 includes means for determining if the ending of the first recorded portion has been played back. If the ending of the first recorded portion has not been played back, then the controlling means 24 controls the determining means 23 to determine if a viewer selected function is received. The viewer selected function may be, for example, rewinding, fast forward, stop, etc.

[086] If the viewer selected function is received, then the function is performed while simultaneously continuing to record the second recorded portion (or the next recorded portion from the recorded portion that is being played back) of the time sequential signal. If the viewer selected function instruction is not received, then the controlling means 24 controls the playing-back means to continue playing back the first recorded portion of the time sequential signal, while the recording means 14 simultaneously continues to record the second recorded portion of the time sequential signal. The viewer can arbitrarily choose to review a portion of the program that has already been viewed by rewinding or otherwise returning the play back from the recording medium to that portion of the program and letting it play again. While the rewinding and replaying of the recorded portion is taking place, the program (which continues to be aired) is simultaneously and continuously recorded on, for example, the second recording medium 22 so that the viewer does not miss any of the program. Further the viewer can fast forward through commercials, or the commercials may be blanked out by detecting the information of the vertical blanking interval from the video signal.

[087] If the ending of the first recorded portion has been played-back, then the controlling means 24 controls the recording means 14 to record an ending of the second recorded portion of the time sequential signal on the second recording medium 22. Then, the controlling means 24 controls the playing-back means to play back the second recorded portion of the time

sequential signal using the second start-recording signal value, in a manner similar to the playing back of the first recorded portion.

[088] As shown in Figure 2, the controlling means 24 may include a microprocessor that is preset to control the performance of the operations of the inventive method as described herein. Recording means 14 records a recorded portions (first recorded portion, second recorded portion, and so on) of a received time sequential signal. The recording means 14 includes a recording/playback head 21 to magnetically record the received portion of the time sequential signal on a recording medium, such as a VCR tape. The recording means 14 also includes a motor 45 for advancing the recording medium during the recording process. The controlling means 24 controls the recording means 14 by appropriately actuating record switches 39 that activate the recording/play back head 21 and the motor 45 to effect the recording process. In the configuration shown in Figure 2, the recording means 14 is effective for recording on a first recording medium 16 and on a second recording medium 22, although, as described herein one or more recording media may be utilized, depending on the configuration of the inventive recording apparatus.

[089] Input receiving means 32 are provided for inputting a pause display command and a resume display command. The input receiving means 32 allows the viewer to asynchronously determine the viewing of the received program, and allows the viewer to input selected functions, such as rewind, fast forward, stop, play, pause, etc. Determining means 23 determines the beginning of the each recorded portion, and playing back means 18 for plays back the recorded portions of the time sequential signal. The determining means 23 includes start-recording value setting means 25 for setting a start-recording value, and start-recording value detecting means 27 for detecting the set start-recording value. The determining means 23

may also include stop-recording value setting means 25 for setting a stop-recording value and stop-recording value detecting means 29 for detecting the stop-recording value.

[090] The playing back means 18 includes the recording/playback head and the motor 45 for advancing the recording medium during the playing back process. The controlling means 24 controls the playing back means 18 by appropriately actuating play switches 41 that activate the recording/play back head 21 and the motor 45 to effect the playing back process. In the configuration shown in Figure 2, the playing back means 18 is effective for playing back recorded portions from a first recording medium 16 and from a second recording medium 22, although, as described herein one or more recording media may be utilized, depending on the configuration of the inventive recording apparatus.

[091] The controlling means 24 controls the determining means 23 to determine the beginning of the first recorded portion depending on the pause display command. The controlling means 24 also controls the recording means 14 so that the first recorded portion is recorded depending on the pause display command. The controlling means 24 further controls the playing back means 18 so that the first recorded portion is played back depending on the determining of the beginning portion by the determining means 23 and depending on the resume display command. In addition, the controlling means 24 controls the recording means 14 so that the second recorded portion is recorded while the first recorded portion is being played back.

[092] The controlling means 24 controls the start-recording value setting means 25 to set the start-recording value depending on the pause display command, and the controlling means 24 controls the playing back means 18 so that the first recorded portion is played back depending the start-recording value and the resume display command.

[093] In accordance with the present invention(s), the stop-recording value setting means 25 comprises at least one of an audio signal generator, a counter, a file allocation table address



generator, and a recording medium location address storing means. The stop-recording value comprises at least one of an audio signal, a counter value, a file allocation table address and a location on a recording medium.

[094] The controlling means 24 controls the playing back means 18 and the recording means 14 to appropriately control the recording/play back head 21 and the motor 45 by controlling the actuation of switches (rewind switch 33, fast forward switch 35 and play switch 41), as well as the record switch 39 and the play switch 41. The time sequential signal is received by the receiving means 12 and sent to, for example, a video signal switch 43, which is under the control of the microprocessor of the controlling means 24. When the time sequential signal is being viewed as it is received (like the conventional manner), then the video signal switch 43 is controlled to send the received time sequential signal to the displaying means 44. When viewing of the time sequential signal is being time shifted, the video signal switch 43 is controlled by the microprocessor to transfer the received time sequential signal to the recording means 14.

[095] Referring to Figure 3, a block diagram of an embodiment of the inventive time shifting event recorder is shown. The inventive time shifting event recorder is used with a recording apparatus 26 capable of recording in a recordable medium at least one selected portion of a time sequential signal. In other words, the commonly used VCR is such a recording apparatus 26 which records on magnetic tape a time sequential signal, such as a television program. In accordance with the present invention(s), receiving means 12 (shown in Fig. 1) receives a time sequential signal representing an event, such as the television program. Recording means 28 records in a recording medium at least one other selected portion of the time sequential signal different from each selected portion recorded by the recording apparatus 26.

[096] Playing-back means 18 retrieves at selectable intervals the respective selected portions of the time sequential signal that are recorded in the recordable medium of the recording apparatus 26 (VCR) and the recording medium of the recording means 28. The playing-back means 8 generates a play back signal dependent on these retrieved portions of the time sequential signal so that the television program can be viewed in the time shifted manner as described herein. Controlling means 24 controls the recording apparatus 26 and the recording means 28 to record the respective selected portions of the time sequential signal. The controlling means 24 also controls the playing back means 18 to retrieve at the selectable intervals the respected selected portions of the time sequential signal and generate the play back signal so that a representation of the event can be produced in a time shifted manner.

[097] The time sequential signal can be either a video signal or an audio signal (or other information carrying signal) and may be received via a cable hook up or an antenna 30 which receives broadcasted radio signals. A remote control 32 can be used to input user selectable control signals to the controlling means 24 so as to control production of the representation of the event in a user definable time shifted manner.

[098] The respective portions of the time sequential signal may be retrieved and/or stored as analog or digital data. For example, a newly developed integrated circuit which is capable of storing vast quantities of digital data may be used as the recording means which allows nearly instantaneous retrieval of the time sequential signal recorded therein. The use of such a memory circuit will reduce the complexity of the inventive time shifting event recorder to thereby reduce the cost to produce and/or the size of the device.

[099] Referring now to Figure 4, in accordance with the present invention(s) a recording means 34 may be provided for recording in a third recording medium 36 at least one gap portion of the time sequential signal different from the portions recorded by the first and second

recording medium 20. Each gap portion is recorded at a time when either of the first and second recording means 14,20 is not able to record the time sequential signal. In other words, if for example, one of the recording media is a magnetic tape which is being rewound while the other recording medium is playing back a portion of the recorded time sequential signal, the recording means 34 will be used to record the event (for example the television program) so that there is a continuous recordability of the television program with no lapse in continuity.

[0100] In this embodiment, the playing-back means 18 includes means for retrieving at a gap interval each gap portion of the time sequential signal recorded in the third recording medium 36 and generating a play back signal dependent thereon. The controlling means 24 includes means for controlling the recording means 34 to record each gap portion of the time sequential signal in the recording means 34. The controlling means 24 further comprises means for controlling the playing-back means 18 to retrieve each gap portion of the time sequential signal, and to generate the play back signal so that a representation of the event can be reproduced in a time shifted manner without a break in continuity caused by a time when either of the first and second recording means 14,20 is not able to record the time sequential signal.

[0101] With regard to at least some of the recording media, such as the disk type (magnetic or optic) and the memory circuit, it is possible that only one such recording medium is necessary to construct the invention. In this case, different portions of the recording medium are used and controlled to simultaneously record at one portion while playing back information recorded at another. This will further improve the device by reducing complexity and costs to make.

[0102] Referring now to Figure 5, an embodiment of the inventive time shifting event recorder for displaying a time shifted representation of an event on a display device is shown. Receiving means 12, such as an aerial antenna 30 for receiving a broadcast signal or a cable coaxial receiver, receives a time sequential signal representing an event (such as a television program).

At least one recording means 40 records in a respective recording medium at least one respective selected portion of the time sequential signal. Playing-back means 18 retrieves at respective selectable intervals each respective selected portion of the time sequential signal recorded in each recording medium, and generates a respective play back signal dependent thereon. Controlling means 24 controls each recording means to record each respective selected portion of the time sequential signal. The controlling means 24 also controls the playing-back means 18 to retrieve at each respective selectable interval each respective selected portion of the time sequential signal, so that the playing-back means 18 generates each respective play back signal.

[0103] In this embodiment of the present invention(s), as shown in Figure 5, supplying means 42, controlled by the controlling means 24, supplies at least one of the respective play back signals and a current portion of the time sequential signal to a display device 44 simultaneously so that at least one time shifted representation of the event can be displayed simultaneously with a current representation of the event on the display device. In other words, a time shifted event representation TSER can be displayed at one portion of a television screen while a current event representation CER is displayed at another portion of the television screen. In this way, the viewer can choose to recall and review again a selected portion of the television program while continuing to view the current event representation in real time.

[0104] In accordance with the present invention(s), supplying means 42 controlled by the controlling means 24 supplies at least two of the respective play back signals to a display device simultaneously so that at least two time shifted representations of the event can be displayed simultaneously on the display device. At the user's option, two or more portions of the event can be replayed simultaneously and viewed by the viewer on a display device 44, such as a television set. As with the other embodiments, each recording medium may be a

magnetic tape, magnetic disk, electronic memory circuit (such as an integrated circuit device disposed on a silicon chip), an optically recordable disk or other suitable recording medium. It is particularly noted that various means for recording information are being constantly developed. Therefore, the present invention(s) is intended to include the use of such information storage devices whether currently known or developed at such future time. As with a previously described embodiment, in accordance with the embodiment shown in Figure 5, each recording medium can be a portion of a recordable disk so that each recording means writes to and reads from the same recordable disk. Alternatively, each recording medium can comprise a portion of memory of a same electronic memory circuit. In this case, each recording means stores information on a same electronic memory circuit. Furthermore, as with the other embodiments, each recording means may record the time sequential signal as digital data, analog data or the like.

[0105] Figure 6 is a flow chart showing the operation of the inventive apparatus for pausing the display of a time sequential signal, and illustrates the inventive method for pausing the display of a time sequential signal. In accordance with the present invention(s), a time sequential signal is received via, for example, an antenna, a cable television hook up, Internet modem connection, satellite transmission or other information transfer mechanism. The information depending on time sequential signal is displayed for viewing on a television, computer monitor, radio, or other displaying device 44. A pause display command is inputted by the viewer through, for example, a remote control, keyboard, voice activation, or other command inputting mechanism. Thus, the viewer selects "break" (step one). A first start-recording value is set (RM1) (step 2). A beginning of a first recorded portion of the time sequential signal is recorded on a first recording medium 16 (begin recording TSS on RM1 (step 3)). At this point, the viewer can attend to a phone call, or otherwise take a break from viewing the program,

while the program continues to be broadcast and received as the time sequential signal. The portion of the time sequential signal that occurs during the break is recorded on the first recording medium 16.

[0106] When the viewer returns, a resume display command is inputted (viewer selects "return" Step 4)). An ending of the first recorded portion of the time sequential signal is then recorded on the first recording medium 16. When the ending of the first recorded portion of the time sequential signal is recorded, a stop-recording value can be set (set RM1) stop-recording value (Step 5)). However, it is not necessary to record to set the stop-recording value, if means is provided to determine the ending of the first recorded portion of the time sequential signal. For example, it can be determined that the ending of the first recorded portion coincides with the beginning of a second recorded portion. In this case, it is not necessary to set a stop-recording value, but rather the ending of the first recorded portion is determined by determining the beginning of the second recorded portion. As an example, the beginning of the second recorded portion can be determined by noting a time (or counter value, address, track, sector, etc. depending on the recording medium) when recording on a second recording medium 22 begins, then the ending of the first recorded portion is immediately preceding that same time (or counter value, etc.). The start-recording value for the second recorded portion would signify for the ending of the first recorded portion and the beginning of the second recorded portion.

[0107] The ending of the first recorded portion is recorded on the first recording medium 16 and recording of the time sequential signal on the first recording medium 16 is stopped (stop recording TSS on RM1 (step six)). The first and the second recording mediums 16,22 may be the same disk or recording mechanism, as described herein.

[0108] Next, a second start-recording value is set (set RM2 start-recording value (step 7)). A beginning of a second recorded portion of a time sequential signal is recorded on a second recording medium 22 (begin recording on TSS on RM2 (step eight)). To recap what has occurred, a viewer or user has determined to take a pause in the display of the continuously aired program. Thus, a pause display command is inputted, and the viewer selects "break" (step one). A first start-recording value is set (step two) and a beginning of the first recorded portion of a time sequential signal is recorded on a first recording medium 16 (step three). When the viewer returns, a resume display command is inputted (step 4) a stop-recording value may be set (depending on the construction of the inventive apparatus), and the ending of the first recorded portion is recorded on the first recording medium 16 (steps 5 and 6). Since the viewer has inputted a resume display command and wishes to continue viewing the program from where the beginning of the break began, a second recorded portion of the time sequential signal must be recorded so that the portion of the continuously received signal is stored for time shifted or asynchronous viewing. Thus, a second start-recording value is set, and a beginning of a second recorded portion of the time sequential signal is recorded on a second recording medium 22. To allow the viewing to begin watching the program again, from the point the arbitrary break was taken, the beginning of the first recorded portion must be determined. This beginning is determined using the first start-recording value. Thus, RM1 is returned to the start-recording value (step 9).

[0109] A number of different inventive mechanisms for determining the beginning of the first recorded portion are described herein. After returning the beginning of the first recorded portion, the first recorded portion of the time sequential signal is then played back for viewing by the viewer (step 10). The first recorded portion of the time sequential signal is continued to be played back from the first recording medium 16, until either a viewer selected function is

received (pause, rewind, fast forward, stop, play, etc.), or the end of the first recorded portion is detected. If, in step 5, a first stop-recording value has been set for the first recorded portion, then the end of the first recorded portion is determined by detecting this stop-recording value. Alternatively, the end of the first recorded portion can be determined by noting when the beginning of the second recorded portion started, by means of a counter, timer, address location, look-up table, or other such device or method. In any event, if the viewer selected function is detected (step 20) then the viewing selected function is performed while continuing to record the second recorded portion of the time sequential signal on the second recording medium 22 RM2 (step 21). After performing the viewer selected function, play back of the recorded time sequential signal continues as instructed in step 11.

[0110] If the end of the first recorded portion is determined (if the first stop-recording value or the beginning of the second recorded portion is detected (Step 12)) then a second stop-recording value can be set (depending on the construction of the inventive apparatus) signifying the ending of the second recorded portion (step 13) and recording of the time sequential signal on the second recording medium 22 is stopped (step 14). The same holds true for the second stop-recording value as holds for the first stop-recording value, wherein alternative mechanisms can be used so that the actual stop-recording value does not have to be set but the ending of the respective recorded portion can be determined by, for example, the beginning of the recording of a next recorded portion.

[0111] At this point, the first recorded portion of the time sequential signal (the part of the aired program that elapsed when the viewer took a break) has been played back for viewing by the viewer. In order to view the rest of the program, the viewing has to view that portion of the program that was received and elapsed while viewing the first recorded portion. In this example, that portion has been recorded on the second recording medium 22 as the second



recorded portion. However, in order to later view the portion of the program that is received while viewing the second recorded portion, another recorded portion (third recorded portion) of the program has to be recorded. Since the portion of the program recorded on the first recorded medium has already been played back, the first recording medium 16 can be used again for recording the third recorded portion. Alternatively, a third recording medium can be used, so that the viewer can rewind back the portions of the program recorded on the first recording medium 16, or can obtain a final full copy of the recorded program for viewing later. A final full copy can be re-recorded onto another recording medium, or the recorded portions can be appended to and spliced together onto one of the recording media of the inventive apparatus.

[0112] Thus, a third start-recording value is set for the first recording medium 16 (or third recording medium) (step 15). The third recorded portion of the time sequential signal thus is recorded on either the first recording medium 16 or a third recording medium. The beginning of the third recorded portion is recorded in step 16. For the viewer to watch the second recorded portion, the beginning of the second recorded portion must first be determined. The second recording medium 22 is returned to the second start-recording value (step 17). Play back of the second recorded portion of the time sequential signal from the second recording medium 22 can then begin (step 18). The play back of the second recorded portion of the time sequential signal from the second recording medium 22 continues, until either a viewer selected function is received or the second stop-recording value is detected (step 19). As has been described above, the second stop-recording value is set so that the ending of the second recorded portion can be determined. However, alternative mechanisms can be employed to detect the ending of the recorded portions, such as determining when the third recorded portion begins. If the second stop-recording value or the beginning of the third recorded portion is detected (step 22), then a third stop-recording value is set (step 23). Again, it is not necessary to set the third stop-

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recording value if alternative mechanisms are employed to detect the ending of the third recorded portion. The recording of a third recorded portion of the time sequential signal on the first recording medium 16 (or the third recording medium) is stopped (step 24). The exact timing of the stopping of recording of the recorded portions and the setting of the start-recording and stop-recording values can vary. For example, the start-recording value can be set just before or simultaneously with the beginning of the recorded portion, and the stop-recording value can be set just after or simultaneously with the ending of the recorded portion.

[0113] If the ending of the second recorded portion is determined and the time sequential signal continues to be received, than a fourth start-recording value is set for a fourth recorded portion of the time sequential signal. The fourth recorded portion is recorded on the second recording medium 22 (or third recording medium or forth recording medium or first recording medium 16 depending on the configuration of the inventive recording device (Step 25)). The beginning of the fourth recorded portion of the time sequential signal is then recorded (step 26), and the recording medium on which is recorded the third recorded portion is returned to the beginning of the third recorded portion (step 27). Play back of the third recorded portion of the time sequential signal begins (step 28) and continues until either a viewer selected function is received or the end of the recorded portion is determined (step 11).

[0114] The inventive apparatus can be constructed from different electronic components depending on the desired operational parameters such as length of recording capacity, speed of operation, compatibility with existing devices, such as VCRs, modems or cable television set to boxes, etc. The inventive apparatus can be configured to utilize different types of recording media, such as a magnetic recording medium, a magnetic recording medium, an optical recording medium, a magneto-optical recording medium, a phase change recording medium and an electronic recording circuit. The start-recording value setting means may include means

for setting a predetermined start-recording value comprised of at least one a predetermined counter value, a predetermined file allocation table address, of a predetermined location on a recording medium and a predetermined random access memory address for setting a predetermined start-recording value for determining the beginning of the recorded portions of the time sequential signal. The start-recording value setting means and the stop-recording value setting means may include a tone signal generator for generating a tone signal, a file allocation table address generator for generating and storing a file allocation table address, a counter for generating and storing a counter value and a random access memory address generator for generating a random access memory address as the start-recording value and the stop-recording value for determining the beginning and the ending of the recorded portions of the time sequential signal.

[0115] Figure 7 illustrates the inventive apparatus in use displaying a received television program 136 while simultaneously displaying a time shifted (paused) program 138 in a picture-in-a-picture window. A cable television set top box 140 incorporates the inventive recording apparatus. A time sequential signal (cable television signal) is received via a cable television line 142. The cable television line 142 carries a number of different channels, each channel carrying a different program. Usually, a viewer selects which channel is tuned into using a remote control 147. In accordance with the present invention(s), the viewer can pause the display of a first program 138, and switch to another channel to view a different program 136. The paused program 138 is recorded in the manner described herein so that the viewer can resume viewing the program at any time, without missing any of it. Further, a modification of the recording scheme discussed above can be utilized to enable simultaneous pausing of two or more programs or switching between two or more programs without missing any portion of either. For example, a viewer can start watching a program 1, and then decide to start watching

a program 2. When program 1 is paused, the recording means begins recording a first recorded portion 1 of program 1. While the first recording portion 1 is being recorded, the viewer changes the television channel to start watching program 2. The viewer may then decide to watch program 1 again, and so the first recorded portion is played back. At the same time that the first recorded portion 1 is being played back, a second recorded portion 1 of program 1 is recorded and a first recorded portion 2 is recorded by the recording means (on different recording media, or on a same recording media as described above). The recording and playback of the two programs continues on in the manner illustrated herein to enable the viewer to watch both programs at his or her leisure.

[0116] Figure 8 illustrates the inventive apparatus in use displaying a received television commercial 144 having an embedded interval page or Internet web page address automatically linked by a hypertext message 146. An interval page is defined herein as a web-like page of information that is received via data embedded within the television signal, as opposed to web page of information that is received via a modem link with the Internet. The Internet has recently exploded in popularity. Computer users are getting on-line to search for and download their choice of information from the large amount of information content already available. Business have realized the commercial prospects of having an on-line presence, and often provide their world wide web site address in print, radio and television advertisements. A computer user with accessing means such as a modem (which can be incorporated in the inventive multi-featured multi-media appliance, such as a set top box 140) can get on-line and access the business' web site to obtain more information about a particular product that the user is interested in. This form of advertisement will most likely become more and more common as Internet use increases. In accordance with the present invention(s), a business advertiser can include an Internet address along with their television commercial. This Internet address or

blanking interval information can be included in the vertical blanking interval of the video signal that carries the commercial, and stored in a RAM or other memory device. If the viewer wishes to access more information about the product advertised, than the program that is being watched can be paused while the viewer accesses the Internet and peruses the advertiser's web site. Viewing of the paused program can continue in the time shifted manner described herein after the viewer returns from the Internet session. Perusing an advertiser's web site, for example, may also occur with a picture in picture system, as described above.

[0117] Figure 9 illustrates the information that might be displayed when a user activates the hyperlink or hypertext message 146 included along with a television commercial. In this case, activation of the hyperlink automatically causes the time shifting capabilities of the present invention(s) to begin recording the television program so that it can be viewed by the user after perusing the commercial-linked information. The television show may continue to be displayed after the activation of the hyperlink 146 while the web-like page is loaded from memory into a video display driver (such as a well known frame grabber manufactured by companies such as miro and AVID). Once the hyper linked web-like page is viewable, the television program is replaced by the web-like page (with time shifting of the television program in progress). The web-like page or interval page illustrated in Figure 9 has a number of hyperlinks included on the page. This interval page can be include along with the commercial (embedded in the VBI). Broadcasters can also sell advertisers the blanking signals that come before and after commercial, so that more content can be loaded, allowing for interval pages with faster and better graphics, etc. Included on the page is a hyperlink back to the television program that was being viewed and is now being time shifted ("click HERE to return to Dirty Dozen"). The name of the television program can be included along with the television signal and all the data can be in ASCII format, or other standard computer-manipulatable format.

[0118] Figure 10 illustrates the information that might be displayed when the user activates one of the hyperlinks included with an interval page. A number of such hyper linked pages can be downloaded and cached by the inventive multi-featured multi-media appliance 1000 during the reception of the television program, the data can be streamed in the background carried in the VBI of the television signal that includes the viewed television program, via and Internet net, or by simultaneously tuning into a data channel carried along with the television channels supplied by the television system provider. As illustrated, some of the hyperlinks can also be linked to an Internet site, such as a world wide web site that includes more information relevant to the product advertised in the television commercial.

[0119] Figure 11 illustrates the information that might be displayed with the user activates one of the Internet hyperlinks included with an interval page. In this case, the information is in the form of a world wide web page with hyperlinks to other world wide web pages, as well as hyperlinks back to the interval site. If the user's multi-featured multi-media appliance includes a computer hard drive, or other digital storage medium, then the some or all of the interval site can be pre-loaded before the commercial, allowing for very fast perusing of the information related to the advertised product. Each of the screens of information can include the link back to the television program, which begins to be played back at the user's option from the point of departure.

[0120] Figure 12 shows a web page with a program grid that can be scrolled by clicking on the arrows at the edges of the grid (or by a remote control arrow button). The grid shows the station name and channel for each of the television channels available on the user's system. The web page shown, may be accessed, for example by selecting a hypertext link displayed on the television screen or computer monitor.

[0121] Figure 13 shows the web page displayed on a television screen or computer monitor and shows the use of a flat screen display panel remote input device. The flat screen display panel can show the related content while the television or computer monitor shows the program (or vice-versa). The user can pause the display of the television program at any time to concentrate on the information displayed on the flat screen. On-line or embedded content can be synchronized with the program to enhance the viewing experience and open up new entertainment and educational possibilities. Further, the interactive nature of the on-line connection will allow the user to provide feedback to the television program producer during a live broadcast. The flat screen display includes a video driver circuit and may receive the information for display via a wireless or wired link with the computer, digital television, Internet appliance, multi-featured multi-media appliance, etc.

[0122] Figure 14 shows a display, such as a television or monitor, used in conjunction with the inventive set top box. In this case, the display is showing a preview program search and selection screen which the user can navigate via keyboard instructions, remote control buttons and/or the use of scroll bars. The display screen shows a number of program frame stills that are updated periodically by tuning in the individual channels and capturing a frame of the video signal. A conventional frame grab device, such as that available from miro Computer Products AG can be employed, each frame is stored in memory, and displayed in a multiple picture-in-a-picture (p-i-p) type display as shown. Alternatively, the individual channels can be displayed with a "live" feed by employing multiple tuners and controlling the image generated on the television or monitor (in a manner similar to the well-known p-i-p display) so that each of the channels is displayed simultaneously.

[0123] A number of scroll bars are displayed at various locations on the television or computer screen. The scroll bars, where appropriate, include scroll arrows which when activated scroll the

information contained in the scroll bars in the direction of the arrow. A channel type scroll bar provides the user with a number of channel type options for narrowing down the programming selection. In this case, "all programs" channel type has been activated. Thus, a channel available scroll bar displays all of the channels available for viewing by the user from the particular television system. The user can then activate those channels or groups of channels that are to be displayed in the updated individual program frame stills. Volume and channel scroll bars are provided, as well as function selection scroll bars. The function selection scroll bar allows the user to toggle between the various television and data signal receiving, displaying and manipulating devices, such as a VCR, computer television, etc. In the top right hand corner a display triangle is provided. This display triangle toggles the display between, for example, the preview screen shown here and a television program, on-line web site, pre-taped program or computer application. When viewing the selected program, the viewer can return to, for example, the preview screen by clicking on the location of the display triangle (which may be faint or invisible).

[0124] Figure 15 shows the television display during a time shifting operation. During the viewing of a television program, the user can click on a remote control button, or click the display triangle location (top right corner) to bring up the control scroll bars. In this case, the viewer has chosen the "time out" icon, and pauses the viewing of the show in the time shifted manner described herein. A still image of the program that was being viewed may be displayed, or the user can go to other television channels or on-line data acquisition. Anytime the user wishes to return to the paused program, the appropriate instruction is inputted to the inventive system as discussed herein and viewing of the program resumes from the point of departure.

[0125] Figure 16 shows an on-line browser displayed during the pause in the television viewing. The viewer can navigate through the world wide web or through content embedded in



[0128] Figure 19 shows a television commercial displayed with a hyper-link to related content embedded in the television signal and/or an Internet Site. The address of the internet site can be added to an advertisers "hot" list and stored in memory so that it can be later accessed by the viewer. This advertisers hot list can be updated during each television program, or may be a cumulative list. Also, using artificial intelligence the viewer's preferences and viewing habits can be noted so that viewer specific advertisements that fit the viewer's own preferences and habits can be sent from the television signal provider. When the viewer goes to the content

provided in the television signal or the Internet, the program is automatically paused and time shift as described herein begins.

[0129] Figure 20 is a block diagram illustrating the components of a television system enabled with the inventive technology. A signal receiver receives an incoming television and/or data signal. In this case the television signal includes channels at prescribed frequencies. Some of these channels carry the television programs and some carry the data. The signal receiver can be, for example, a cable television set top box or Internet/television appliance, such as WebTV. This signal is tuned by a television signal tuner and a data signal tuner. The television signal tunes in the television programs and acts as the television signal connection. The data signal tuner tunes in the data signal contained in the television program (or via another information transport vehicle, such as a telephone line, satellite or wireless system). This data signal is provided to, for example, a computer CPU where it can be stored, or otherwise manipulated. The television signal from the television signal tuner and the data from the computer CPU are received by controlling means (which may be the computer CPU). The controlling means controls the display of information on the displaying means depending on input from a user interface. The user interface includes a remote user inputting means, such as, but not limited to, a keyboard, a wireless keyboard, a voice activation mechanism, or remote control. A signal from the user inputting means is received by a remote signal receiving means, which is similar to the remote control signal receiver employed by, for example, a conventional VCR. The receiving means may be infrared, wire or RF based depending on the remote signal. The receiving means feeds its signal to the user input determining means where the remote signal is converted to instructions that can be used to manipulate the control of the recording means, displaying means, television signal tuner and data signal tuner by the controlling means

depending on the user's desires. The controlling means also controls the recording means (as described herein) to record the television signal and the data signal depending on the user input.

[0130] Figure 21 is a block diagram illustrating the components of another television system enabled with the inventive technology. In this case, the signal for at least one television channel includes a television program/data mix of multiple frequencies. The television program portion normally will be the bulk of the channel signal, with the data portion comprising information that can be incorporated into portions of the television signal such as the vertical blanking interval. The data signal can include information related to a particular television program and may be included in the vertical blanking interval of the television signal. Alternatively, the data signal can be a separate television frequency or channel. The data can be "front loaded" before a program begins. In this case, the data can be sent from the television signal provider during most or all the signal intervals that occur prior to the show, and just during the VBI. This data can be stored locally on the user's apparatus, and can be linked to the program via, for example, HTML code or the like. For example, when a television commercial having a hyperlink embedded in it is displayed, the user can click on or otherwise activate the hyperlink and the appropriate stored data retrieved for display (at the same time, the television program can be time-shifted in the manner described herein).

[0131] The incoming video and data signal mix is received by signal receiving means (such as a set top box, or television tuner/data signal tuner circuitry). The received signal is processed by a signal processor. The signal processor include a television signal tuner and a data signal tuner. The television signal tuner tunes in a channel in the conventional manner. Data processing occurs using a data signal tuner for extracting the data information from the channel signal by determining when the VBI occurs, and capturing the data stream contained in the VBI. This data is stored in data storing means, such as a computer hard drive, recordable CD or

DVD, RAM, magnetic tape, etc. Data process means (CPU) is used to process this data depending on, for example, user inputted instructions.

[0132] Figure 22 schematically shows a screen displaying television program scheduling information as described above with reference to the Internet web site. The information signal containing the data regarding the programming schedule can be received via the television connection as a portion of the television/data signal mix. The data signal is filtered out or otherwise separated from the television signal and the data is stored on a hard drive, RAM or other storage medium. Alternatively, the information can be continuously sent from the television system provider. This information allows the user to search for programs depending on a number of search criteria such as program listing, day, language, special and program (Column A).

[0133] As shown in Figure 23, the viewer can choose to have the VCR controlled via the inventive apparatus to facilitate program recording. The data is received from the television system provider rather than from the Internet, and the information is stored locally on the user's system or can be remotely stored on the television system provider's storage medium, in a manner similar to the storage of information specific to a particular user employed, for example, by WebTV.

[0134] Figures 24 through 27 show various nonlimiting configurations or a remote control input device that can be used in accordance with the present invention(s). The input device can be a remote controller that includes push buttons (Figure 24); a track pad (Figure 25); a track ball (Figure 26 and/or a wireless keyboard (Figure 27). The remote input device can be optical or radio based, or may be hard wired to the input receiving means.

[0135] In accordance with the present invention, a time sequential signal is received via, for example, an antenna, a cable television hook up, Internet modem connection, satellite

transmission or other information transfer mechanism. The information depending on the time sequential signal is displayed for viewing on a television, computer monitor, radio, or other displaying device . The information that is displayed may be a television or radio program, or received data from a computer network, such as the Internet. The present invention enables asynchronous viewing of a multicasted or broadcasted television program in conjunction with the perusal at the viewer's leisure of computer network information, such as a world wide web page downloaded from the Internet. The present invention allows a viewer to pause the display of a program and switch to another media system, such as an Internet connection. The viewer can access information from the Internet computer network while pausing the display of a television program.

[0136] The time sequential signal may be a television program which contains a blanking interval (a portion of the video signal that is received during a time when the video display scanning returns to the top of the screen). The blanking interval can include blanking interval information including a selectable link, such as a network address, to network information, such as a world wide web page, from a computer network, such as the Internet. The television program is displayed before receiving the pause display command. When the viewer wishes to obtain information via the Internet, the viewing of the television program is paused and the computer network is accessed using a modem or other suitable accessing means. The network information that is addressed by the selectable link is received from the computer network. This network information is displayed while the viewing of the television program is paused and time sequential signal is recorded so that the program viewing can be returned to at a later time without missing any of the program.

[0137] As described above with reference to Figure 8, etc., the inventive multi-featured multi-media appliance can display a received television commercial 144 having an Internet address

automatically linked by a hypertext message 146. Viewing of the paused program can continue in the time shifted manner described herein after the viewer returns from the Internet session.

[0138] The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described. Accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.